IB/04/3304

Sertifikaat

REPUBLIEK VAN SUID AFRIKA

PATENT KANTOOR
DEPARTEMENT VAN HANDEL
EN NYWERHEID

Certificate

REPUBLIC OF SOUTH AFRICA

PATENT OFFICE
DEPARTMENT OF TRADE AND
INDUSTRY

Hiermee word gesertifiseer dat
This is to certify that

the documents attached hereto are true copies of Forms P2, P6 and provisional specification and drawings of South African Patent Application No. 2003/7897 in the name of De Beers Consolidated Mines Limited

Filed : 9 October 2003

Entitled : Augmented Video Surveillance

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Geteken te **PRETORIA** in die Republiek van Suid-Afrika, hierdie 3 dag van **February 2005**

Signed at **PRETORIA** in the Republic of South Africa, this 3 day of **February 2005**

.....
Registrar of Patents

FORM P.2

REPUBLIC OF SOUTH AFRICA	REGISTER OF PATENTS	PATENTS ACT, 1978

OFFICIAL APPLICATION	LODGING DATE: PROVISIONAL	ACCEPTANCE DATE
21 01 2003/7897	22 9 OCT 2003	47
INTERNATIONAL CLASSIFICATION	LODGING DATE: COMPLETE	GRANTED DATE
51	23	

FULL NAME(S) OF APPLICANT(S)/PATENTEE(S)

71 DE BEERS CONSOLIDATED MINES LIMITED

APPLICANTS SUBSTITUTED:	DATE REGISTERED
71	

ASSIGNEE(S)	DATE REGISTERED
71	

FULL NAME(S) OF INVENTOR(S)

72 1. COX, GREGORY
2. ANDREW, COLIN

PRIORITY CLAIMED	COUNTRY	NUMBER	DATE
N.B. Use International abbreviation for country (see Schedule 4)	33 NIL	31 NIL	32 NIL

TITLE OF INVENTION

54 AUGMENTED VIDEO SURVEILLANCE SYSTEM

ADDRESS OF APPLICANT(S)/PATENTEE(S)

36 STOCKDALE STREET, KIMBERLEY, 8301, SOUTH AFRICA

ADDRESS FOR SERVICE	S & F REF
74 SPOOR & FISHER, SANDTON	PA135919/P

PATENT OF ADDITION NO.	DATE OF ANY CHANGE
61	
FRESH APPLICATION BASED ON	DATE OF ANY CHANGE

SPOOR & FISHER

REPUBLIC OF SOUTH AFRICA
REVENUE
09.10.03
R 0060.00
HASR 711
REPUBLIEK VAN SUID AFRIKA

FORM P.1

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

APPLICATION FOR A PATENT
AND ACKNOWLEDGEMENT OF RECEIPT
(Section 30 (1) – Regulation 22)

The granting of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

OFFICIAL APPLICATION NO.		S & F REFERENCE
21	01 * 2003/7897	PA135919/P

FULL NAME(S) OF APPLICANT(S)	
71	DE BEERS CONSOLIDATED MINES LIMITED

ADDRESS(ES) OF APPLICANT(S)	
	36 STOCKDALE STREET, KIMBERLEY, 8301, SOUTH AFRICA

TITLE OF INVENTION	
54	AUGMENTED VIDEO SURVEILLANCE SYSTEM

THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2. THE EARLIEST PRIORITY CLAIM IS:

COUNTRY: NIL NUMBER: NIL DATE: NIL

~~THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.~~

21	01	

~~THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND IS BASED ON APPLICATION NO.~~

21	01	

THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1. A single copy of a provisional specification of 5 pages.
- ☒ 2. Drawings of 1 sheet.
- ☐ 3. Publication particulars and abstract (Form P.8 in duplicate).
- ☐ 4. A copy of Figure of the drawings (if any) for the abstract.
- ☐ 5. Assignment of invention.
- ☐ 6. Certified priority document.
- ☐ 7. Translation of the priority document.
- ☐ 8. Assignment of priority rights.
- ☐ 9. A copy of the Form P.2 and the specification of S.A. Patent Application No .
- ☐ 10. Declaration and power of attorney on Form P.3.
- ☐ 11. Request for ante-dating on Form P.4.
- ☐ 12. Request for classification on Form P.9.
- ☒ 13. Form P.2 in duplicate.
- ☐ 14. Other.

74 ADDRESS FOR SERVICE: SPOOR & FISHER, SANDTON

Dated: 9 October 2003

SPOOR & FISHER
PATENT ATTORNEYS FOR THE APPLICANT(S)

REGISTRAR OF PATENTS, DESIGNS, TRADE MARKS AND COPYRIGHT
RECEIVED
2003 -10- 09
REGISTRATEUR VAN PATENTE, MODELLE, HANDELSMERKE EN OUTEURSREG
REGISTRAR OF PATENTS

SPOOR & FISHER

FORM P.6

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

PROVISIONAL SPECIFICATION

(Section 30(1) – Regulation 27)

OFFICIAL APPLICATION NO.		LODGING DATE	
21	01 2003/7897	22	9 OCTOBER 2003

FULL NAMES OF APPLICANTS

71	DE BEERS CONSOLIDATED MINES LIMITED

FULL NAMES OF INVENTORS

72	COX, GREGORY ANDREW, COLIN

TITLE OF INVENTION

54	AUGMENTED VIDEO SURVEILLANCE SYSTEM

"AUGMENTED VIDEO SURVEILLANCE SYSTEM"

BACKGROUND TO THE INVENTION

THIS invention relates to an augmented video surveillance system.

Recognised problems with known video surveillance systems, whether for security or other purposes, are boredom and inefficient or improper reaction to specified events by surveillance operators. A further problem is that there are only limited methods for measuring or monitoring the performance of surveillance operators.

The present invention seeks to address these problems.

SUMMARY OF THE INVENTION

According to the invention there is provided an augmented video surveillance system in which a surveillance video is augmented by insertion, into live video images seen by an operator, of synthetic or realistic objects and/or by visual enhancement of predetermined events taking place in the live video image seen by the operator, such insertion requiring specific action by the operator, and monitoring the action taken by the operator in response to such insertion.

The objective of the invention is to improve the performance and effectiveness of the operator and to measure his performance online. In accordance with the invention this is achieved by engaging the operator's attention by interaction with the live video with the result that the operator's levels of vigilance and interest are elevated. The system proposed by the invention may be used to provide on-line operator training.

The invention also provides apparatus for use in the system summarized above.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example only, with reference to the accompanying block diagram which illustrates the principles of the invention.

SPECIFIC DESCRIPTION

Referring to the diagram, the numeral 10 indicates an event controller which controls and implements video augmentation according to the invention. The event controller 10 can be programmed to augment a live video seen by an operator in a number of different ways which may be implemented alone or in combination with one another.

In one version live video events are brought to the attention of the operator. These are actual live events taking place in the scene observed by the operator. Examples of typical events include entry of a person into the observed scene, addition or removal of inanimate objects to the scene. This is indicated by the numeral 11 in the diagram.

As described in a simultaneously filed, co-pending patent application filed by the present applicant and entitled "Enhanced Video-Based Surveillance System" a background image or model is generated and, during the course of live video monitoring. The overall image is segmented into respective background and foreground segments and video enhancement techniques are employed visually to enhance all or selected foreground features or events, thereby drawing the operator's attention to such features and events.

The system described above may be interfaced with a video motion detection system also described in the aforementioned co-pending patent application, in which case the operator's attention is drawn, by camera switching and/or image enhancement to specified motion events in the observed image. This is indicated by the numeral 13 in the diagram.

The operator is trained to respond to specified foreground features or events, in each case in a predetermined manner. The system may be used to measure the operator's efficiency in responding in the appropriate manner to specified features.

The invention proposes the insertion of certain synthetic or realistic objects or events into the image viewed by the operator. In one example the event controller 10 acts in response to a rules-based event generation module 12 to initiate the generation, by a synthetic object generator 14, of a synthetic event or object and augments the raw, live video image 16 by inserting such event or object into the image, thereby forming an augmented video image 18 which is viewed by the operator. In each case the controller 10 controls all parameters relating to the insertion, eg the frequency of insertion, the duration of the insertion and so on.

Synthetic objects are objects which are inserted into the viewed image and are classified as synthetic because they do not blend into the imaged scene and can be clearly identified by the operator as artificially inserted objects. Typical examples are fanciful shapes such as stars, squares, circles or still pictures of persons. In each case the insertion may require specific action by the operator, as indicated by the numeral 20.

Where the live video seen by the operator is augmented by insertion of an inanimate, fanciful image such as a star, circle or square, the operator may be required to operate a mouse pointer and to click on the insertion in order to remove it. The operator's reaction time and ability to carry out the required action can be monitored to provide an indication of the operator's

efficiency and training and can, if necessary, be logged as part of the operator's performance record.

Different categories of synthetic objects, each requiring a different reaction by the operator, can be inserted. For instance, still pictures or images of persons may show such persons displaying normal normal, unsuspicious behaviour and may require a first type of response by the operator. On the other hand, pictures or images of persons displaying suspicious behaviour might require a totally different type of response by the operator. The augmentation of the live video by the insertion of different types of synthetic image may thus require the operator to have the ability to distinguish between different events and to act accordingly in response to the specific event with which he is confronted. Once again, the operator's reaction to the inserted object(s) can be used to provide a measure of his ability and efficiency.

The object insertion technique described in the preceding paragraph also serves a valuable function in on-line training of the operator in that it can raise the operator's awareness of certain types of personal behaviour which may be considered undesirable from a security point of view, for example a person assuming a certain bodily posture in the vicinity of a high-risk area such as a cash-counting or gem sorting station.

The invention also envisages the augmentation of the live video by insertion of realistic objects or events, under the control of the event controller 10 and in accordance with the rules-based event generation module 12. In this case, realistic video objects, such as animated sequences extracted from previously recorded images of the scene under surveillance, as indicated by the block 22 in the diagram, are inserted back into the live video image 16 to produce the augmented image 18 in such a manner that the operator is unable to distinguish between artificially inserted objects and real objects of the scene. So, for instance, live video footage of a person moving in the surveilled scene can be inserted to produce the augmented image.

The operator will once again be required to react in a certain way to the augmented video which he sees. Where, for instance, augmentation involves insertion of video footage showing an act of theft, the technique can be used to monitor the operator's ability to recognize the act and to react accordingly.

In each of the examples described above, the operator will be required to interact, in accordance with his training, via an interface generator 24. Where a synthetic object has been inserted, the operator may for example be required to click once, with a mouse pointer, on an image such as a fanciful image or a realistic image of non-threatening type or to click twice on an image representing a security threat. The event controller may be programmed to give feedback to the operator, via the interface 24, to indicate that the correct action has been taken. The inserted object may for instance be cause to flash and/or to disappear from the image, thereby acknowledging the correctness of the operator's action.

Dated this 9th Day of October 2003

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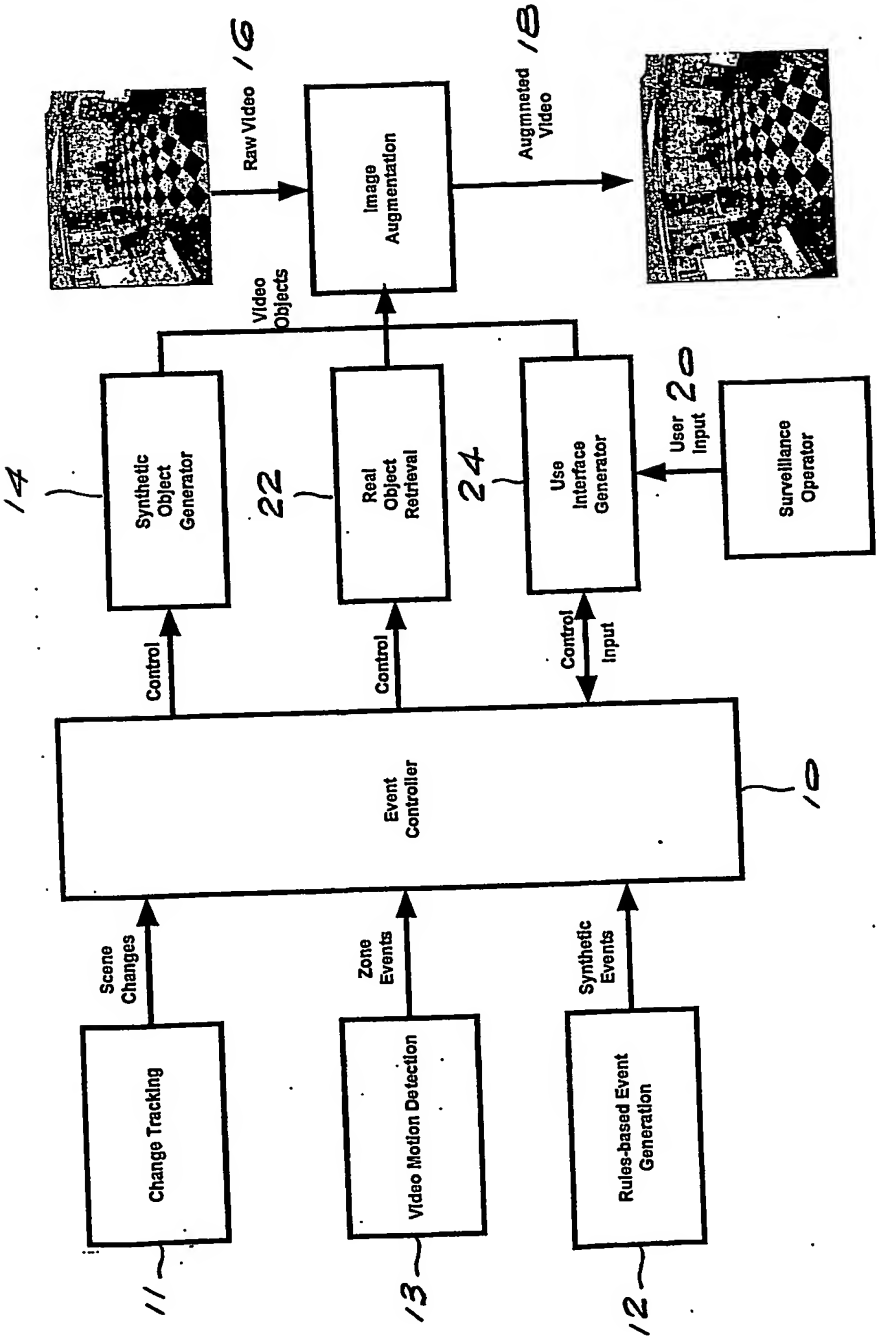
Spoor & Fisher
Applicant's Patent Attorneys

De Beers Consolidated Mines Ltd
Provisional Specification



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